Declaration under 37 CFR 1.132

Please accept the declaration of Stephen Fitzgerald filed here with.

Interview summary 37 CFR 1.133 (b)

Please accept an interview summary in respect of telephone interviews held with the examiner since the issuance of the last office action.

Discussion

Amendments

The new figures show respectively:

Figures 6.1, 6.1A, 6.1B - a single wall polymer composite tubular bat with a thickened barrel wall 21;

Figures 6.2, 6.2A, 6.2B - a double wall polymer composite bat with a localized area of the fibre type and/or fibre angle change within the insert, and

Figures 6.3, 6.3A, 6.3B - a double wall polymer composite bat with thickened barrel wall 21 within the insert,

all resulting in increased radial stiffness generally confined to the sweet spot area of the barrel portion. Copies of these figures are being filed separately by mail.

In order to clarify the meaning of the text, the variations to the Fig. 6 embodiment that concern increased wall thickness have been shown in the new drawing sheets attached. These new figures Figs. 6.1 - 6.3B have been added as providing a better understanding of the Fig. 6 embodiment. These figures depict aspects of the Figure 6 embodiment previously noted as not shown in the drawings, but which were referred to in paragraphs 0053 and 0064 of the application as filed. Accordingly, these figures do not constitute new matter.

Reference to further amendments to the disclosure will be made in conjunction with the claims to which they relate.

Examiner's Earlier Objections to New Matter

The examiner has objected to the amendment filed December 23, 2005, pursuant to 35 USC 132 (a) as adding new matter. The objected-to new matter is identified by the Examiner by the following passages:

"The new disclosure with regard to Fig 6 in paragraph 61 (sic) lacks basis in the original disclosure. The thickness specifically discussed in the original disclosure only pertains to the embodiment having a stiffener 18 or a variation of the Fig. 6 embodiment. The Fig. 6 embodiment does not offer this feature but instead includes a section 20 of the bat which adjusts the stiffness by means of fiber type or angle change.

"The thickness limitation of at least 8 1/3% thickness in paragraph 61 is likewise without support in the original disclosure. There is not a basis for the thicknesses used by applicant to derive this value.

"Also in paragraph 61 the more narrowly focused ranges of the stiffener wall thicknesses, and the inclusion that the barrel wall thickness is also in these ranges represents subject matter with no support in the original disclosure."

The examiner then states that the applicant is required to cancel the new matter. The reference to paragraph 61 is believed to be a typographic error for paragraph 62.

Paragraph 62 as presented and entered by the last office action, showing the amendments then being made, reads as follows:

[0062] The thin polymer composite stiffener 18 of the present invention has a stiffener wall which is typically in the order of .005 inches to .040 inches in thickness, with a length of 2 inches to 6 inches which is typically less than 50% of the barrel length, such as 16 2/3 % of the barrel length, as is apparent from Figure 10. A 4 inch stiffener, as referenced in paragraph [0059], in a 12 inch barrel as referenced in Figure 10, would represent 33.3% of the barrel length; a 4 inch ~~stiffner~~ **stiffener** in a 16 inch barrel would represent 25%, and a 2 inch ~~stiffner~~ **stiffener** in a 16 inch barrel would represent 12.5% of the barrel length. The stiffener 18 is preferably bonded, fully or partially, to the main member 16, or to the secondary member insert 13 of Fig. 7 or to the secondary member sleeve 14 of Fig. 8, or combinations thereof on either the internal or external barrel walls, as shown in Figures 4, 5, 7 and 8. Analogous to Figures 4, 5, 7 and 8 an alternative solution (since stiffness is proportional to thickness) to the stiffener 18 is to vary the barrel thickness 6 **to the same extent and manner** along ~~any portion of~~ the barrel length 1 **of any bat according to the invention, including the bat of Figure 6,** in order to vary bat performance. The barrel portion's effective wall thickness in the mid-section can be greater by [[5%]] **8 1/3 % or more** over the thickness of the barrel in the lateral, adjacent portions. Conversely, the barrel wall's thickness beyond its central portion, in the lateral regions proceeding towards the end portions of the barrel, may be at least [[5%]] **8 1/3** % thinner than the thickness of the barrel wall in the mid-section. **Just as the stiffener wall may be typically in the order of .005 inches to .040 inches in thickness, or .010 inches to .040 inches in thickness, or .015 inches to .040 inches in thickness, or 0.015 inches to 0.030 inches, so too the analogous increase in barrel wall thickness along the mid-section may fall within the same ranges.**

Separating out the passages, the following apparently relevant portions of the above paragraph were amended in the last Response:

1. "Analogous to Figures 4, 5, 7 and 8 an alternative solution (since stiffness is proportional to thickness) to the stiffener 18 is to vary the barrel thickness 6 **to the same extent and manner** along ~~any portion of~~ the barrel length 1 **of any bat according to the invention, including the bat of Figure 6,** in order to vary bat performance."

2. "The barrel portion's effective wall thickness in the mid-section can be greater by [[5%]] **8 1/3 % or more** over the thickness of the barrel in the lateral, adjacent portions. Conversely, the barrel wall's thickness beyond its central portion, in the lateral regions proceeding towards the end portions of the barrel, may be at least [[5%]] **8 1/3** % thinner than the thickness of the barrel wall in the mid-section."

3. "**Just as the stiffener wall may be typically in the order of .005 inches to .040 inches in thickness, or .010 inches to .040 inches in thickness, or .015 inches to .040 inches in thickness, or 0.015 inches to 0.030 inches, so too the analogous increase in barrel wall thickness along the mid-section may fall within the same ranges.**"

It is unclear whether the examiner is applying 35 USC 132 (a) rejection to all of these references, including item 1, based on the premise that the disclosure in respect of the species of Figure 6, or the original disclosure in its entirety, does not support the proposed amendment. Accordingly, all three passages will be addressed.

First passage

Referring to the first passage, it is hard to see how a new matter rejection could be applied to this passage. The additional words, shown in bold, effectively restate more clearly the effect of the earlier phrase: "Analogous to Figures 4, 5, 7 and 8 an alternative solution (since stiffness is proportional to thickness) to the stiffener 18 is to vary the barrel thickness 6." The applicant cannot see a basis for a 35 USC 132 (a) rejection of this passage and asks the examiner to withdraw his ruling in this respect.

Second passage

Without prejudice and without admitting that the examiner is correct in his assertion as to the new matter character of the 8 1/3 % reference, the applicant has included an amendment with the present Response changing 8 1/3% back to 5%. A Claim directed to this 8 1/3 % range value is retained in the application for purposes of appeal.

Third passage

The examiner objected that the amendment to insert sub-ranges of thickness into the disclosure within the initially described range of 0.005-0.040 inches for the thickness of the mid-section of the barrel portion constituted a new matter violation of 35 USC 132 (a). The examiner requested deletion of this amendment from the disclosure.

Sub-Range Limitations

In the previous Response the applicant included extensive references to the USPTO board of appeals decision in *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Those submissions are adopted herein.

The applicant submits that the insertion of the sub-ranges does not constitute new matter because it is clear from the disclosure in the specification as originally filed that the inventor's had possession of the invention not only in terms of the initial broader range of thicknesses as explicitly stated in the disclosure, but also implicitly in respect of sub-ranges that would obviously be available within the broader range.

In the decision in *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976), the ranges described in the original specification included a range of "25%- 60%" and specific examples of "36%" and "50%." A corresponding new claim limitation to "at least 35%" did not meet the

description requirement because the phrase "at least" had no upper limit and caused the claim to read literally on embodiments outside the "25% to 60%" range, however a limitation to "between 35% and 60%" did meet the description requirement.

Quoting *Union Oil of Cal. v. Atlantic Richfield Co.*, 208 F.3d 989, 997, 54 USPQ2d 1227, 1232-33 (Fed. Cir. 2000) (Description in terms of ranges of chemical properties which work in combination with ranges of other chemical properties to produce an automotive gasoline that reduces emissions was found to provide an adequate written description even though the exact chemical components of each combination were not disclosed and the specification did not disclose any distinct embodiments corresponding to any claim at issue) the Court in In *re Wertheim* stated: "[T]he Patent Act and this court's case law require only sufficient description to show one of skill in the . . . art that the inventor possessed the claimed invention at the time of filing.".

In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976) establishes the principle that when a specification sets forth a range, and it is obvious that the inventors had possession of or understood the invention as being present throughout the range, then the inventors have equally invented sub-ranges within the original range.

Since these passages clearly indicate that an applicant can claims sub-ranges, and that is what this applicant is endeavoring to do, it is logical and appropriate that the applicant be entitled to amend the disclosure to provide statements that correspond with such claims. The applicant requests the examiner to withdraw his objection to the sub-ranges that have been inserted by amendment into paragraph [0064].

Withdrawn claims

In the outstanding office action the examiner has withdrawn from consideration claims 14-30, 33-36, 40, 41, 42/(36,40), 43/42/(36,40), 44/42/(36,40), 45/42 (36,40) and 46-52. These claims have been withdrawn on the basis that they are directed to a non-elected invention, considering that the applicant had elected the embodiment of Figure 6 in the Response filed on August 31, 2005. The applicant contests that ruling, reserving the right to raise the propriety of the examiner's ruling on appeal. The applicant asserts that Figure 10 is relevant to all of the withdrawn claims. However, without prejudice, no further objections will be presently raised in this Response to the withdrawal of these claims. As Claims 37 to 39 are subject to new dependent claims, Claims 42 - 45 are being treated herein as also being withdrawn.

In the event that the examiner does find claims of this application to be allowable, the applicant requests the opportunity to draft further dependent claims based on the features of the withdrawn claims that depend from claims which are found to be allowable.

Claims 31 or 32.

The applicant has cancelled Claims 31 and 32 without prejudice to the reassertion of such claims at a later date.

Scope of Elected Embodiment – Figure 6

In making his ruling that the balance of claims were withdrawn from examination, the examiner stated:

> "Figure 6 which was elected by the applicant ... pertains solely to an embodiment wherein fiber type/angle change vary the radial stiffness".

And,

> "The Figure 6 embodiment does not offer this feature (of thickness variation) but instead includes a section 20 of the bat which adjusts the stiffness by means of fiber type or angle change."

Further, the examiner had previously asked for an election between Figures 4, 5, 6, 7 and 8 of the figures in the original disclosure specification. The applicant elected Figure 6, with traverse. In presently refusing to address the withdrawn claims, the Examiner in the office action dated Feb 2, 2006 concluded:

> "The only embodiments disclosed wherein the thickness of the barrel is varied are those with a stiffener and apparently a variation of the Fig. 6 embodiment which is not shown."

The applicant contests these assertions. It is submitted that the species of Figure 6 is not limited to the figure itself. Rather Figure 6 is associated with a species that is also characterized by text in the disclosure.

Support for thickness characteristics in Figure 6

Figure 6 is addressed in the disclosure not only by the depiction in the drawing, but also by various features of the invention that are indicated in the disclosure in a way that can be attributed to Figure 6. This includes not only text that references Figure 6 directly, but also the description of the invention under the Summary of the Invention. An important parameter that can be attributed to Figure 6 is the thickening of the barrel wall in order to produce a mid-section in the barrel portion wherein the barrel wall of the mid-section has a barrel wall radial stiffness which is greater than the radial stiffness of the barrel wall in the two lateral portions.

The original disclosure as filed is replete with references to the feature of thickening the barrel wall in order to produce a mid-section in the barrel portion wherein the barrel wall of the mid-section portion has an increased barrel wall radial stiffness over the radial stiffness of the barrel wall in the two lateral portions. This is particularly true in respect of the references in the Summary of the Invention portion of the disclosure that are relevant to Figure 6. The following summary of pertinent information taken from the original text of the disclosure is presented for the Examiner's convenience. References establishing that the object of the invention in stiffening the mid-portion of the barrel included doing so by increasing the thickness in such mid-portion are as follows:

(0016) "bats of the present invention are stiffened in the area of peak bat performance commonly referred to as the sweet spot. Typically, this is an area approximately 2" to 4" in width."

(0017) "An alternative solution of the present invention to vary stiffness, and thus bat performance, along the barrel portion is to vary thickness along the barrel portion."

(0019) "precisely stiffening only the peak performance area (generally the sweetspot area) of the existing bat to the performance level of the barrel portion areas immediately adjacent on both sides of the sweetspot of the unstiffened bat"

(0034) "Fig. 6 shows ..... resulting in increased radial stiffness generally confined to the sweetspot area of the barrel portion."

(0048) AB thickness = .100" to .140 (Al)"; up to .220" (comp); bl = 4 to 12"

(0049) YB, FP, SP softball thickness = .060" to .090" (Al); up to .220" (comp); bl = 4 to 16"

(0053) "radial stiffness which determines bat performance can be controlled (ie. designed to a given requirement) by altering such parameters as the fiber alignments along the bat length, and/or the types of fibers chosen, their dernier or layout density and/or the thickness of the polymer composite structure.

(0056) "the sweetspot area is located around the middle of the barrel length and is in the order of 2" to 4" in length"

(0057) "the performance of a baseball bat of the prior art follows a statistical normal distribution along the barrel length centered near the middle of the barrel length in the sweetspot area.

(0062) "the thin polymer composite stiffener of the present invention is typically in the order of .005" to .040" thick with length 2" to 6". Thought not shown, an alternative solution (since stiffness is proportional to thickness) to the stiffener 18 is to vary the barrel thickness 6 along the barrel length 1, either full length or any portion of the barrel in order to vary bat performance.

(0064) "though not shown, this embodiment (re. Fig 6) applies equally well to double wall and multi-wall (more than two walls) tubular all polymer composite bats. Though not shown (re. Fig 6), the fiber types, and/or fiber angles, and/or fiber sizes, and/or composite thickness can be designed such as to graduate the radial stiffness of the barrel portion along its entire length.

(Claim 13) "A bat according to claim 12 wherein said barrel portion's thickness is at least 5% thinner, at either or both end portions of said barrel portion, than the central portion of said barrel portion.

The added Figures 6.1 to 6.3B now depict what was previously described and noted as not shown. Accordingly, it cannot still be said that the species of Figure 6 – 6.3B does not reflect a bat with a mid-section of the barrel portion that is of increased thickness.

Examiner's basis for rejection of Claims 37, 38 and 39

Claims 37, 38 and 39 as presently amended respectively address the features of:

37. ... reinforcing fibers at various angles with respect to the longitudinal axis, the reinforcing fibers present within the barrel wall of the mid-section being at a higher average angle with respect to the longitudinal axis than the average angle of the fibers within the barrel wall of the two lateral regions of the barrel portion

38. ... reinforcing fibers in the barrel wall in the mid-section with a higher percentage of fibers in the mid-section than in the lateral regions

39. ... reinforcing fibers of types having differing stiffnesses, and the reinforcing fibers within the barrel wall of the mid-section contain a higher percentage of fibers of higher stiffness than in the lateral regions

Each of these claims as amended concludes with the further qualification that the above fiber configurations have the result: "to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot."

In respect of the reference to fibers of a higher stiffness in Claim 39, the Examiner had not previously objected to the use of this expression in claim 39, although these words were not explicitly present in the original disclosure as filed. Support in the disclosure for the introduction and use of this expression is found in paragraph [0053] as follows:

"[0053]... radial stiffness which determines bat performance can be controlled (i.e. designed to a given requirement) by altering such parameters as the fiber alignments along the bat length 1, and/or the type of fibers chosen, their denier **(e.g. fiber stiffness)** or layout density and/or the thickness of the polymer composite structure."

The insertion of "fiber stiffness" is inferable from the reference to the type of fibers chosen or their denier. No new matter has been added.

The examiner has rejected claim 38 under 35 USC 102 (e) on the basis that Vacek's insert 112 provided in the center of the barrel contains layers of fibers and thus "this portion of the barrel has a greater percentage of fibers than do the portions of the barrel at either end of the insert."

The Examiner's rejections based on Vasek were largely, if not solely, based on a technical misunderstanding as follows. A feature of composites, prevalent in all prior art bats as referenced by the Examiner, is that by changing fibre types and/or fibre angles or orientation, and/or fibre size between layers, bat properties can be readily changed. However, as shown in the prior art cited, changing the composite parameters changes bat properties (e.g. stiffness and strength) from one bat to the next, but not within a given bat design, in particular, not along the barrel length as in the present invention.

There is no teaching in the cited prior art to change properties along substantially the entire barrel length within a given bat design. For example, Vasek's Fig. 5 design as described in (0046 and 0047) clearly is as described above. Vasek's Fig. 5 consists of four prepreg sheets (which by definition are all unidirectional material) arranged in layers of 0°, 90°, +45°, -45° running substantially the full length of his bat. Thus, Vasek's radial stiffness taken in the middle region, the lateral regions adjacent to the middle region, and the end regions are all equal. This clearly does not teach the invention as disclosed in the present application which teaches varying radial stiffness along the length of the barrel portion to achieve a substantially enlarged sweet spot by ensuring that the radial stiffness in the mid-portion of the barrel is greater than the radial stiffness in the two lateral regions.

An examination of Figure 2a of the Vacek patent shows that the insert 112 extends all the way to the end. It cannot therefore be said that: "this portion of the barrel has a greater percentage of fibers than do the portions of the barrel at either end of the insert" because this is not true at the distal end of the bat. The examiner is ignoring the limitations in claim 38 that there be:

> "d) two lateral regions extending on either sides of the mid-section towards the distal and proximal ends respectively,
>
> wherein the barrel wall of the barrel portion consists of polymer composite material which contains reinforcing fibers in the barrel wall in the mid-section with a higher percentage of fibers *in the mid-section* than in the lateral regions
>
> to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot."

There are not two lateral regions in the Vacek design that meet the requirements of this claim. Accordingly, Claim 38 should not be rejected on the basis of anticipation under 35 USC 102 (e). Nor should it be rejected on the basis of obviousness because there is nothing in Vacek to suggest the introduction of two lateral regions that contain either a lesser percentage of fibers or fibers of lesser stiffness than in the mid-region so as to give rise to the sweet spot affect inherent in the present invention-. Even in light of the other cited prior art, the Vacek patent does not provide grounds for a rejection of Claims 38 on the basis of obviousness. The reasons next provided with respect to the obviousness objection to Claims 37 and 39 apply in respect of Claim 38.

The examiner has rejected claims 37 and 39 under 35 USC 103(a) as being obvious in view of Vacek. The examiner specifically refers to paragraph 47 of Vacek as teaching the presence of a greater percentage of fibers in the area of the insert. That paragraph reads as follows:

> [0047] As shown in FIG. 5, the sleeve 112 is formed by placing the series of four sheets 500 on a cylindrical mandrel 520. There are four layers of lay up which form the series of sheets 500. Two of the layers 501, 502 are at plus or minus 45 degrees. The layer 503 is at 90 degrees and the last layer 504 is at 0 degrees. The fibers within the impregnated or pre-impregnated material are at 0 degrees when they are substantially aligned with a longitudinal axis 522 of the mandrel 520 or a longitudinal axis of the cylinder of the sleeve 112.

The fibers within the impregnated or pre-impregnated material may also be said to be at 0 degrees when they are substantially aligned with an axis of the bat 100 running from the center of the tubular end 110 to the center of the handle end 120. The four layers 501, 502, 503, 504 are E-glass fiber impregnated with resin. It should be noted that the sheets 501, 502, 503, 504 can also be any fiber and resin system. It should be noted that the layup angles can change as well as the number of layers and still be within the scope of the invention. For example, in some embodiments layers 501 and 502 may be included in a single sheet.

Nowhere, however, in this passage nor elsewhere in the Vacek reference, is there a teaching to provide for the presence of two lateral regions on either side of the mid-section of the barrel that meet the criteria of:

> 37.... reinforcing fibers at various angles with respect to the longitudinal axis, the reinforcing fibers present within the barrel wall of the mid-section being at a higher average angle with respect to the longitudinal axis than the average angle of the fibers within the barrel wall of the two lateral regions of the barrel portion
>
> 39.... reinforcing fibers of types having differing stiffnesses, and the reinforcing fibers within the barrel wall of the mid-section contain a higher percentage of fibers of higher stiffness than in the lateral regions to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel,

both with the added limitation: "to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot."

Accordingly, the rejection of claims 37 and 39 on this basis should be withdrawn.

If the examiner were to reject Claims 37, 38 and 39 as being obvious over Vacek in view of Fritzke, then it must be observed that Fritzke is using composites to strengthen what is essentially an aluminum bat. In fact, Fritzke is doing this to deal with the deficiencies of aluminum which has a tendency to be dented. There is therefore no suggestion in Fritzke of taking away the aluminum core used as part of his insert in making a bat, and further removing the aluminum frame, to produce a bat with a barrel that consists of polymer composite material with the fiber configurations as described in Claims 37, 38 and 39.

Again, it cannot be said that, in the context of all the limitations of these claims, that it would be obvious to combine Vacek and Fritzke to produce the subject matter addressed by these claims.

New Claims directed to thickness

The applicant has addressed all of the objections raised by the examiner to the claims that the examiner says are under examination. The applicant now wishes to address new claims that have been added to the application which address the feature of thickening a portion of the barrel wall.

To repeat what has been stated above, explicit reference has been made in the disclosure in respect to the species of Figure 6 that indicates that the barrel wall thickness can be used as the controlling structure to achieve the object of the invention. Reference is made particularly to

paragraph [0064] of the disclosure which reads as follows:

> [0064] A third embodiment of the present invention Fig. 6 is a single wall tubular polymer composite baseball bat which in accordance with the present invention has a localized area of fiber type and/or angle change 20 resulting in increased radial stiffness generally in the sweet spot area 19 located in proximity to the middle area of the barrel length 1. This embodiment applies equally well to double-wall and multi-wall (more than two walls) tubular all polymer composite baseball bats ..... The fiber types, and/or fiber angles, and/or fiber sizes, ***and/or composite thickness*** can be designed such as to graduate the radial stiffness of the barrel wall within the barrel portion 1 along its entire length. That is, the radial stiffness could be highest in the peak performance area (generally the sweet spot area 19) and gradually changing in uniform increments proceeding towards the barrel ends.

Thus all of the preceding discussion in the disclosure referencing the possibility of increasing barrel thickness in the mid-section portion of the bat is attributable to Figure 6.

New Claim 53

New Claim 53 has been added which reads as follows:

"53.(New) A tubular bat with a longitudinal axis comprising a cylindrical handle portion for gripping, a cylindrical tubular barrel portion of given length for striking, the barrel portion having a barrel wall with a barrel wall thickness and distinct locations including a sweet spot area within its length, and a tapered bridging portion connecting the handle portion and the barrel portion, wherein the barrel portion has:

a) a distal end remote from the handle;
b) a proximal end where the tapered portion connects to the handle portion;
c) a mid-section within the barrel portion, the mid-section being of shorter length than the length of the barrel portion and including the sweetspot area;
d) two lateral regions extending on either sides of the mid-section towards the distal and proximal ends respectively, and
e) a radial stiffness for the barrel wall at each location along the length of the barrel portion

wherein the barrel wall thickness in the barrel mid-section that contains the sweet spot area is greater than the thickness of the barrel wall in the lateral regions and:

- the thickness of the total barrel wall is at least 5% greater in the barrel mid-section than in the two lateral regions

- the thickness of the total barrel wall is 0.005 to 0.040 inches greater in the barrel mid-section than in the two lateral regions, and

- the area of greater thickness in the barrel mid-section is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel

wall portion without there being present a boundary therebetween whereat different materials are in contact with each other."

Distinction of Claim 53 over Fritzke

Fritzke's Fig.s 14 and 15 teach strengthening a metallic insert (not a bat), undimensioned as to thickness, by providing it with two composite layers having a thickness of .003" and .0055", respectively 8.5" and 4" in length with the objective of strengthening the bat - "superior durability characteristics"; "with little or no reduction in performance." Only the second layer has fibers at 90° to the bat length that would have a tendency to increase radial stiffness.

Furthermore, Fritzke's 8.5" composite layer with a thickness of .003" leaves no unstiffened lateral regions along the barrel portion of reduced radial stiffness on both sides of a stiffened barrel mid-section, which is preferably 2–6 inches in length, to ensure maximum bat performance and a broadened sweet spot. This leaves only the composite layer of .0055" thickness to be addressed for the purposes of this application.

Claim 53 and new dependent claims have been drawn to clearly distinguish the foregoing inventive features of the present invention over Fritzke. Three characterizing limitations are now provided in Claim 53:

- the thickness of the total barrel wall is at least 5% greater in the barrel mid-section than in the two lateral regions

- the thickness of the total barrel wall is 0.005 to 0.040 inches greater in the barrel mid-section than in the two lateral regions, and

- the area of greater thickness in the barrel mid-section is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel wall portion without there being present a boundary therebetween whereat different materials are in contact with each other.

There is no teaching in Fritzke from which we can infer expressly that the increase in thickness proposed in respect of Figures 14 and 15 is as great as 5%. This feature alone distinguishes over Fritzke.

The range limitation of 0.005 to 0.040 inches for the increase in barrel wall thickness does commence with the value that is less than 0.0055 inch thickness of Fritzke's second composite layer. However, the previous limitation already distinguishes over Fritzke for purposes of 35 USC 102 and it cannot be said that the range presently proposed is an obvious extension of the value proposed by Fritzke because Fritzke was unaware of the present invention's unexpected result of the enlarging of the sweet spot that would arise from significantly stiffening the barrel only at a limited mid-portion location.

The final limitation that the thickened region is integrally formed with the underlying part of the barrel wall clearly distinguishes over Fritzke in that Fritzke was addressing the problem of increasing the strength of an aluminum wall by adding composite layers. Therefore it cannot be

said that Fritzke was addressing the provision of an increase in thickness that was integrally formed with the material of the underlying barrel.

Paragraph [0053] has been amended to add what is implicit in the construction of the applicant's bats, namely:

" Such thickened polymer composite material is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel wall portion without there being present a boundary therebetween whereat different materials are in contact with each other.

Metals can also be used to produce an integrally formed thickening in the barrel wall.

The applicant has filed a declaration by Stephen Fitzgerald under 37 CFR 1.132 that provides a comparison of the effects on respective bats of the Fritzke-design and present invention arising from thickening specific portions of the barrels as disclosed. This comparison provides calculated values for radial wall stiffness, as measured by assessing the radial stiffness of annular segments of the bat, taken independently of the context of being part of a bat as a whole, the "hoop" radial stiffness.

From this assessment it has been shown that bats stiffened in accordance with the 0.005" to 0.040" thickness increase of the present application as applied to composite bats of the applicant, having integrally formed regions of increased thickness, would have a hoop radial stiffness increase of 89 to 186 % at the sweet spot. By way of comparison, this analysis shows that the Fritzke-type bat as depicted in Figure 14 provided a projected increase in radial stiffness of 25%, which is well below the range of the present invention and would not significantly increase the sweet spot size in the unexpected manner of the present invention.

This value for the projected increase in radial stiffness for the Fritzke reference was calculated on the assumption that both the Fritzke's composite layers, totaling 0.0085 inches, constituted the relevant increase in thickness. However, the first 8.5 inch long layer may not qualify as contributing to sweet spot broadening as it's length provides virtually no remaining space for there to be lateral regions. The presence of unstiffened lateral regions is important to maintain maximum bat performance.

Considering only the 0.0055 inch thick, four inch long stiffened area of the Fritzke Figure 14 disclosure by itself, the increase in radial stiffness of the stiffened area compared to the stiffness of the directly adjacent lateral regions would, if the calculations in the Fitzgerald declaration were redone, be less than 25% because those calculations assumed the presence of a central layer totaling 0.0085 inches in thickness.

Other claims dependent on Claim 53

All the remaining claims in the patent are dependent on Claim 53. The scheme with respect to the remaining claims is as follows.

Claims 54, 55 and 56 respectively add to claims 37, 38 and 39 the limitations of claim 53. Claims 57, 58 and 59 then, referring back to Claims 37, 38, 39 or 53, add sub-ranges within the original 0.005 to 0.040 inches range for increased wall thickness, sub ranges which are subject to the acceptance by the examiner that the sub-ranges do not constitute new matter.

With respect to Claim 60, the original disclosure of the present invention teaches as one variant the option of increasing barrel radial stiffness only within the barrel area of peak bat performance (refer to paragraphs [0016], [0019] and [0034]). This had the unanticipated result of increasing the sweetspot size which is located around the middle of the barrel length and is in the order of 2 to 4 inches. Fritzke's Figures 14 and 15 do not so localize the area of increased stiffness. Claim 60 addresses the stipulation that the increased thickness of the barrel wall in the barrel mid-section is the only part of the barrel portion that is of increased thickness over the thickness of the barrel wall in the lateral regions, cf. para [0019]: "precisely stiffening only the peak performance area (generally the sweetspot area) of the existing bat to the performance level of the barrel portion areas immediately adjacent on both sides of the sweetspot of the unstiffened bat".

Claim 61 stipulates that the barrel mid-section of increased thickness is centered around the middle of the barrel. Claim 62 states that the lateral regions start 1" to 3" from the center of the mid-section and extend towards the proximal and distal barrel ends. These limitations are supported by the description of the invention in the disclosure. cf. para "[0060] .... The polymer composite stiffener 18 fiber type, fiber angles and thicknesses are designed such as to reduce the bbs from 100 to 96 in the center 2 inch area of the barrel length 1 and from 98 to 96 bbs in the 1 inch areas immediately adjacent to the center area."; "[0062] The thin polymer composite stiffener 18 of the present invention has a stiffener wall which is typically in the order of .005 inches to .040 inches in thickness, with a length of 2 inches to 6 inches..."

Claim 63, 64, 65 and 66 refer progressively to the ratio of the length of the mid-section to the total length of the barrel. The examiner has already allowed an amendment making these ratios explicit, based on the numbers provided in the original disclosure from which these ratios can be inferred.

Claim 67 and 68 respectively stipulate for the bat of the invention being a single wall bat and a multi-wall bat, which includes a double wall bat.

Claims 69 stipulates for a bat as in Claim 57 wherein the barrel wall thickness on either side of the barrel mid-section that contains the sweet spot area is graduated towards a decreasing thickness within the lateral regions. References to this feature occur in several places in the disclosure cf. para [0020]: "... accomplished by graduating the radial stiffness of the barrel wall along the entire barrel length.... the stiffness of the barrel wall along the barrel portion between the sweetspot and barrel ends being graduated..... the total composite multi-layered laminate or structure having graduated radial stiffness along the barrel portion length." ; "para [0064] ....The fiber types, and/or fiber angles, and/or fiber sizes, layout density and/or composite thickness can be designed as otherwise described such as to graduate the radial stiffness of the barrel wall within the barrel portion 1 along its entire length. That is, the radial stiffness could be highest in the peak performance area (generally the sweetspot area 19) and gradually changing in